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We also secured two plants from seeds of tricots of the 1919 crop of our own growing. We have seed from these plants also.

So far we cannot see that we have gained anything in the way of an increased ratio of tricots in the tomatoes. However, the plants have not been as well selfed as this year. We expect to continue this experiment with the tomato.

We note the following facts concerning the work with the castor bean: We planted 265 seeds left over from a tricot of 1918. One of these was a tricot. Out of 62 seeds from the 1919 crop, which were second-generation tricots, there were three tricots. The respective ratios are 264-1 and a little better than 20-1 (59-3). This shows a considerable gain. This year for the first time we have destroyed all other plants of castor beans on the place, and hence can expect a fair certainty of self-pollination, at least as to blood. There were no plants of this kind near our place, so far as we could ascertain. We await with interest the outcome of the coming year's test. We have an abundance of seed from this year's plants for use.

An interesting fact observed on some of the plants this year was that the 120-degree angle between the three cotyledons was continued for at least two nodes up the stem. This would indicate that the polycotyledony was certainly in the blood of the plant, so to speak, and points to better results for the future.

HERMAPHRODITISM IN THE AUSTRIAN PINE.

On May 16, 1920, we observed a strobile or cone of an Austrian pine in Maplewood cemetery, the upper third of which is pistillate and the rest staminate. We do not know how common this may be, but we have no recollection of having observed such a phenomenon before. We have the specimen preserved in formaldehyde.

Archæology of the Tuba-Kayenta Region.

(CONTINUED FROM 1919.)

ALBERT B. REAGAN.

The archæological work in the field in 1920 covered a larger area than in 1919. This work verified former conclusions:

1. The Navajo is a product of absorption of other tribes, the nucleus being an Athapascan stock, evidently of the Apache branch of that family. Moreover, the Navajo stock, as we know it, is in the same region to-day that it grew up in, so to speak. In other words, it has never occupied any other region, though the Apache stock from which its nucleus sprang undoubtedly did, probably coming from the north.

2. The Utes, Piutes, and probably the Shoshonean Indians, have undoubtedly played an important rôle in this region in both remote and recent time, the present Hopis being of Shoshonean stock.

3. The intensive farming and use of water for irrigation and the reservoiring of every side mountain canyon for village use and for irrigation caused the master streams to be filled up and the valleys to be aggraded, a process which continued even to our own time. Professor Gregory¹ says a lack of rainfall

1. See Gregory, Herbert E.; *Geology of the Navajo country*: U. S. Geol. Prof. Paper 93, pp. 130-132.

to a certain limit would cause the valleys to be aggraded. If, on the other hand, man used the water to that same limit, the aggrading result would be the same. And the evidence that the cliff dwellers did so is unquestionable. Every side wash canyon and flat had its village or villages, its dams, ditches and reservoirs, as is readily seen by carefully examining the region. The aggrading of the valley floors and the often laking of same was evidently directly due to man's work. This is attested by the fact (1) that the flora and fauna is now the same as when the cliff dwellers lived here, with the exception of what the white man has exterminated since his coming; (2) and that in the sections that have little rainfall now, such as the flats about and to the north of El Capitan, but few villages in the open or in the canyons are found, and these are often small, whether open or cliff ruins, indicating that they were merely hunting-season or summer-outing villages. The evidence adduced is that the climate is the same now as when the villagers lived here. Moreover, then and up to thirty years ago all the precipitation was kept in the region, and the rainfall of to-day would sustain a large population if it was all used for crop production, as it was then, provided the people had as few wants as those villagers had and also made use of all the herbs of the fields and mountain slopes as even the Hopis do to-day. It is said that the Hopis now use 146 plants.

4. At the very time when the region was most favorable for their maintenance—a ponded, laked region—they left it.

5. The evidence adduced is that they were driven out or absorbed by more savage tribes. (See discussion on this subject in my previous report.)

6. The ruins in the region indicate that the civilization was at least in part built up in the region and later destroyed. The structures advanced from the crude type, through the slab-house stage, to the six-pilastered kiva and plastered, well-laid-up houses; and then, after the culmination of that civilization, it retrograded through the slab-house type to the Navajo hogan. There are Navajos at Sayaway, twenty-one miles east of Kayenta, now living in hogans very similar to the slab houses described by Kidder and Guernsey.² A band of village Indians was incorporated in the Navajo or Ute tribe, voluntarily or as a result of war, and as time passed the pueblo structure of house of these absorbed people gradually changed to that of the savage peoples who were absorbing them. So that all stages of structure can be found between the six-pilastered kiva and the medicine lodge and living hogan of the Navajo and the dwellings of the Piutes, Utes and Apaches, depending on which peoples were absorbing that particular group of villagers.³

2. Kidder and Guernsey; *Archæological explorations in northeastern Arizona*; Bull. 65, Bureau of American Ethnology, pp. 41-46, 152, 153.

3. In building his house the Navajo adapts himself to the location and the scarcity of timber at hand and the amount and size of the fuel wood. In the timbered region, say about Black mesa, the hogans are of the regulation type, such as described in the "Handbook on American Indians" (see vol. 1, pp. 515-519, and vol. 2, pp. 41-45); but in the non-timbered regions, as, for instance, at Donahotsso and Sayaway, the hogan is circular and very small, often not ten feet across. The writer has seen them not six feet across. They are also sunk two or more feet in the ground and have a semi-cone-shaped roof over them. Some also have slab-stone walls, the flags set on end. One at Sayaway has a sloping, one-sided roof, and one of the very smallest hogans there has a fireplace in the east wall. These circular, sunken rooms with conical roofs certainly resemble Kidder and Guernsey's slab houses very much in structure (see above). Other features, of course, are not the same; for instance, the door. A Navajo door is always at the east side of the hogan; the ancients had the door wherever convenience suited them. A more careful study of the Navajo house structure in the region might throw considerable light on the ancient ruins that dot the country from end to end.

Below is a description of the ruins examined in 1920 (the numbers beginning where they were left off last year):

No. 100. On a ledge on the east face of Tyende mesa, about a mile north of Cup rock, about six miles northwest of Kayenta and two miles southwest of Slim rock, there is a single-room ruin. It is built on a high shelf against the mesa wall. Its walls are semicircular. Its roof is now gone. Its greatest length is eight feet in a north-south axis. Its greatest width is about six feet. It had a very small door. Some corncobs were found in it; otherwise it was destitute of anything ancient. Its walls were of rock, well laid in adobe. The building had evidently been a granary.

THE KAYKOHTE RUINS.

A small stream, the Kaykohte wash, enters Laguna creek from the north just west of Moqui rock, west of the Kayenta reclamation dam. Its course is generally north and south. It is incised in a canyon wall in the valley fill, the outer walls of the valley being composed of Navajo sandstone. The valley canyon is usually much less than one-half mile in width. About four miles from the mouth of the stream it forks, and about two miles further north the east branch again forks. (To this time the writer has not ascended the west branch and not to the head of the east fork.) The stream and its branches are perennial and have clear water running in them most of the year, while many of the other streams of the region are 80 per cent mud. They also have perennial springs at their heads and at various places along the rock walls. There is now plenty of water for village use in the stream and in the various springs, also water for irrigating purposes. The Navajos have extensive fields in the valley, where they raise much corn, pumpkins and melons. As now, there was water in this valley in former times, besides in the long ago it was not canyoned up as now, the region being laked. At that time a numerous people of the village-cliff-house type lived and had extensive fields, as the ruins indicate. While they lived here the valley went under some change in the way of laking, as is evidenced by certain graves, as will be mentioned later. About a mile above Moqui rock to three miles above it many graves were made in what was then a sand plain. At a later date the region there became submerged in a shallow lake in which a deposit of marly adobe was deposited from three to ten feet in thickness. The canyon cutting is now exposing these graves, as we shall see later. Below is a description of the ruins north of Moqui rock to where the main stream branches, and then up the eastern branches as far as explored by the writer, except those described in my previous paper.

No. 101. This is a ruin on the east (main) fork of the east branch of this creek, about due west of ruin No. 100. It was not seen by the writer, but it was described to him by his Indian guide, Yellow Head. He stated it was a circular ruin in the open and made a considerable pile.

No. 101½. This ruin is on the west side of the west branch of the creek. It was not seen by the writer, but by his helper, Clarence Taptuka. It is a cliff cave. He did not believe it had been visited previously, as it was with difficulty that he reached it from the valley. He found a pot in it and several other artifacts. No excavating was done, so it is not known what it may contain. Its size was not ascertained.

No. 102.⁴ On the west side of the east branch of the main creek, under a projecting, overhanging arch about three miles above where the creek forks, there is rather an extensive village with walls six or more feet in height. The village contains a gallery which was once at least two stories high and contained three rooms in floor length, all of a total length of twenty-four feet and a depth of from eight to ten feet. It is perched upon a ledge some ten feet above the main village and is unapproachable except by a ladder. Consequently, as we had no ladder, we could not examine it. The west end room seemed to possess at least a part of its roof; the others were roofless. The middle room's wall was much broken down at the front. Stubs of beams still stuck through the walls, which showed where the second-story floor was located. There also appeared to be portholes in each story, ranging the exposed field at various angles. There seemed to be much seepage at the top of the ledge on which this gallery was placed. Also in the rear of the rooms and back of them there was a box elder tree and much grass and weeds growing. and on the ledge above the gallery there were patches of green, usually of coarse grass. The gallery covered every available space on the ledge to its very edge. The first layer of the walls on the ledge was mortar. Then alternating mortar and very small stones and shingle rock were used till the wall was leveled up. From here to the top the wall was made of stone, plastered in with adobe. So well was the work done that the adobe plaster even to-day is almost as hard as the sandrock it holds in place.

The lower building consists of a retaining wall sixty-six feet in length, extending along the very edge of the ledge on which the ruin is placed. Besides the retaining wall, it contains five rooms, marked from *A* to *E*, and some slight indications of two or three smaller rooms. The rooms show rafter spaces or stubs of rafters in place, though no room is now roofed. Stubs or holes for beams for second floors also show in some of the rooms. Portholes for shooting arrows through also show, each made slantingly, so that the arrow could be dispatched in the desired direction. To get the angle desired, some of the holes angle quarteringly to the room; others pitch downward. Some also show the arrow marks of use. The walls were constructed much like those of the gallery. A peculiar feature of the mortar is that it is full of pottery fragments. Another peculiar thing about the ruin is that pottery fragments about it are scanty, and what there are could be from the weathering of the walls containing the pottery fragments, probably derived from ruin No. 103, next described. Also the painted pottery so far found is different from that of the other ruins of the valley. As stated, the pottery of the mortar must have been derived from ruin No. 103. If not from it, the whole village was reconstructed from the ruins of a former village on the same site, the refuse of that village being made into the mortar, as is indicated by the pottery fragments. This also may account for the scarcity of the pottery fragments about the site. Moreover, the retaining wall seems to have been built as such, as a fort protection and as a windbreak, as it apparently did not connect with any set of rooms by roofing for at least a part of its distance, with the exceptions of rooms *A* and *B*, in which the retaining wall was the outer wall of the rooms.

The village does not seem to have been completed and seems to have been

4. Rev. Leigh Segar aided me in examining and "mapping" this ruin.

constructed as a fort. Moreover, it seems to have been used but little. If ever completed, its walls for the most part must have been wickerwork plastered over with adobe, as are some of the rooms at Keetseel and Betatakin. However, if such rooms were constructed, no trace of them can now be found. As stated, it is the writer's opinion that the edifice was constructed as a fort and was never completed. (See plan, plate 2.)

About 100 yards southwest of ruin No. 102, on the same ledge, which again becomes a shelf, there is a small patch of adobe-plastered stone wall, probably three feet in length, still in place. It is what is left of what was once a series of rooms fifty-four feet in length and probably five feet in height (the space height now) by a depth of five feet. Time has removed all this series but the single block mentioned. There is no permanent water within a half a mile of this ruin.

No. 103. This ruin tops a high sand-knoll point about one-fourth mile due south across a Navajo cornfield from ruin No. 102. On the southwest side of the knoll is a kiva in foundation in an imperfect circle of about eight feet across. One foot of stone wall still remains in place. It seems that there was once a door at the northeast side, which would exclude the edifice from being a kiva; but probably the apparent door space was the ventilator to the edifice. Near this building the fragments of what appears to be a cooking jar was found. Seven paces east of the kiva there is shown a wall seven paces long, running north and south, apparently having fallen to the west. On account of the work of erosion, the original size of the village could not be determined. Some one has dug much about the site, and especially about the circular room.

No. 104. (Pole House; see plan, plate 2.) This ruin is set in the rock face of a cliff high up on a ledge and can only be entered by climbing a pole. It fits a little hole in the rock wall of the mesa face, and was so constructed as to fill the whole space, some extra space being cut out of the rock to make the desired size. It consisted of three rooms, two front rooms and a storeroom in the rear. The walls of the storeroom are now much crumbled, as is the greater part of the wall of the smaller outside room. The size of room 1 (the large, west, outer room) is 14 feet in length, 5 feet in height and 8 feet in depth. Room 3 (the rear storeroom) is 5 feet deep and $3\frac{1}{2}$ feet high. The southwest wall of room 2 (the east outer room) runs southeast from the southwest corner of room 1 for a distance of 5 or more feet and meets the roof ledge 4 feet from the base. Each of its other walls, which are about 4 feet in length, are much broken.

Thumb-nail marks show in the adobe mortar, also fingerprints. The shelf was also excavated and enlarged to make the space needed for rooms.

No. 105. Southeast of No. 104, on a sand ridge about 300 yards distant, are the remains of a village. Besides other debris, a circular room five feet across shows in foundation of stone. Near it two separate fireplaces show.

No. 105½. Across the canyon, eastward from No. 104, around a southwest projecting point about a half mile to the southeastward, there has been a large village perched under an overhanging cliff roof. The floor of the cliff cave, then as now, was on a level with the surrounding valley to the front. The village was large and seems to have extended in a large circle beyond the area protected by the cliff. The village is wholly obliterated except two

of the southwest rooms which stand against the cliff. Both of these were small and now are roofless. The doors of each were small. Only a part of the south room's walls are now in place. Besides these two rooms, parts of foundation walls of two other rooms show. In the sandrock base some twenty feet southwest of the two rooms are two very large mortars, separated from each other by a space of about ten feet. They are circular, a foot in diameter and a foot and a half in depth. They were undoubtedly used in grinding corn and in pounding nuts. The Navajos have used the site for a sheep corral and sheep droppings cover it to a depth of six to ten inches. Some one, presumably Doctor Cummings and archæological parties under his direction, has dug much about the site, especially in the area between the mortars and the two rooms mentioned. The digging shows much broken pottery, also chunks of roofing adobe which had been made into mortar before being placed on the roof. The thickness of some of these pieces also indicates that the walls of at least a part of the rooms were of latticework, over which plaster was spread, as is seen at Betatakin. Moreover, the fewness of the rocks about the site compared with the great amount of broken pottery—indicative of a large population having occupied the site—would seem to bear out the conclusion that much of the house walls was of plastered latticework. This village was long occupied and had a numerous population.

No. 106. Along the same canyon wall as ruin No. 105½, about a half a mile to the southwestward under an overhead, hooded, projecting cliff that faces the south, there has been quite a large village. One small room against the east wall of the cliff is still extant, but now roofless. It has a very small door. A Navajo uses it as a lamb corral. He also lives under this cliff in summer. At the time examined he had a box of corn against the wall under the cliff, also much household goods piled upon some poles. He also had dug two cistern-shaped caves in the debris, where he had placed his perishable feed the previous fall. Shells of decayed pumpkins were strewn all about the site.

Against the back wall, 100 feet northwest of the room, are ten feet of a rock wall foundation of a room, and quite a distance west of this there is part of another foundation wall showing. The village had been constructed of adobe, or latticework plastered over with adobe, all of which has for the most part been removed by time. The pottery about the site is scanty. The approximate size of the village cannot now be determined. Its site was an admirable location for a village in that day and time.

No. 107. (Picture Cliff Cave and Village.) On the same side of the canyon in a little *rincon*-curved area facing the south, about a half a mile south of No. 106, is a large cliff cave space that once possessed an adobe village of considerable size, all of which has now been leveled by time. About 100 yards southwest of the cliff cave there is quite a mound of a village ruin. From the mound the writer obtained much beautiful pottery fragments, also several *manos*. Over the cliff space there is drawn in white the figure of probably a lizard, or a human being sporting a foxtail pendant. This drawing is about two feet in length. Also, the whole rock face to the westward of the cave space to the width of 50 feet and a height of 20 feet is covered with pictographs, principally of mountain sheep, coiled lightning, and kachinas. The size of the village or villages that occupied this site cannot now be conjectured.

No. 108. This was a village occupying the top of a sand mound in the open, about a mile southwest of ruin No. 107. Its site is marked only by broken pottery. Time and erosion have removed so much of the site that no idea of the size of the village can now be suggested.

No. 109. Much broken pottery marks the site of a small village in the valley about a half a mile nearly south of ruin No. 108.

No. 110. These are patchy remains of what was probably an adobe village or graveyard on the east bank of the wash (Kaykohte), that enters Laguna creek to the west of Moqui rock about one and a half miles north of that rock. The encroaching creek has washed most of it away.

No. 111. This is an extensive ruin on and about a promontory east of the Kaykohte, about a half a mile south of ruin No. 110. The ruin was very extensive and was built of stone. On the promontory there was evidently a large edifice, which was probably the watchtower citadel. At the base of the promontory on all sides are signs of an extensive ruin, now represented by foundations of rooms in regularly arranged lines of foundation stones and much rock debris and broken pottery. The original floors of the rooms, with the ashes in the fireplaces, still occasionally show; also terraced platforms, where the houses were built from the base of the promontory to its top, still are in extant. The base of this village is also on a rock bench overlooking the valley from a height of probably fifty feet. Moreover, in the valley adjacent there are signs of a village once occupying the site. An arched place under the west face of the rock bench there contains many pictographs on its walls and the outlines of ruins at its base. Probably 300 people lived in the combined villages represented by these ruins.

No. 111½. On the east side of the Kaykohte, along its immediate bank and extending from there eastward opposite ruin No. 111, from Moqui rock northward for over a half a mile there is much scattered village debris. No walls show, but large quantities of broken pottery, metates and *manos* are profusely strewn about. At least three village sites seem to be represented, and as many graveyards. The villages were of adobe and have "melted down" with time and are now wholly gone. If occupied simultaneously, at least 2,000 people must have occupied these sites.

Last spring my Hopi helper, Clarence Taptuka, discovered an exposed pot in the graveyard of the south one of these villages. Digging, he found that he had discovered a grave. Later he had me go with him, and we dug the grave down so that the skeleton was exposed, some two feet below the surface. The pot he had found was a large corrugated cooking pot. It was much broken, but in it were six other jars in a good state of preservation. The skeleton was also well preserved. It was the skeleton of a female. The large jar containing the smaller ones was at her head. Another jar, somewhat broken, was over her head. Her body was doubled and was lying on its left side, facing east, with the head to the south. Her knees had a cracked pot over them, as did also her feet. A cracked jar was also at her back. We secured the jars and carefully covered up the skeleton, knowing that Professor Cummings and the Arizona archæological party would be out soon. When they came the pots were turned over to them and are now in the state museum in the university at Tucson, Ariz. He then dug up the skeleton,

examined it and took photographs of the same. The archæological people then made a search of the region for other graves, finding many. As a result of these efforts and our discovery, much pottery and several complete skeletons were secured. The burials also showed that they had been made in a sand plain, as we have previously seen, and that at a later date the region was laked and a marly adobe deposited over them to the thickness of several feet. Then in recent years the renewed canyon cutting has exposed them. Whether the people of ruin 111 buried their dead in this flat cannot now be determined, but it is probable that they did. The writer wishes to add that there are probably hundreds of graves in this section yet unexcavated.

No. 111¼. These are pottery shards and some rock, marking the site of a village in the flat between Moqui rock and the mouth of the Kaykohte. It seems to have been a large village.

No. 111¾. This is the remains of a village similar to ruin No. 111¼, above. It is situated in the flat about 300 feet northwest of Moqui rock, not far from the last-named ruin. It is quite possible that the two village sites formed a single village in the old times, or were simultaneously inhabited.

No. 111 M. This is the site of a village one-sixteenth of a mile west of Moqui rock on a little knoll west of Kaykohte wash. Its debris, mostly broken pottery, covers an area seventy-seven feet square, with most of the pottery showing toward the south. Probably 100 people lived in this village.

No. 111 N. This is the remains of a similar ruin about one-sixteenth of a mile west of the latter ruin. The remains of a woman's grave near it shows five metates.

No. 111 X. This is the remains of a small ruin on a sand mound about a mile north of Laguna creek, some two miles north of the Peach orchard, on the Kayenta road to the pass. The village was small and was probably wholly of adobe, as nothing is now left on the site but broken pottery and some stained dirt, with the exception of a few fireplace rock which are not now in place.

REMARKS ON THE KAYKORTE RUINS. Most of the villages described under this caption were made of adobe and have "melted down" and the clays have been leached away till now only a few scattered fireplace rock and much broken pottery and grinding slabs mark the sites. Some of the open villages show the unit type more or less, and some appear to have been built around a central round to square building in a compact, wheel style. Some of the sites seem to show evidence of a part of the village having been made of wickerwork plastered over with adobe mortar.

Besides the grave-excavation work of this past summer in this region, already mentioned, the writer has been advised that Professor Cummings and his archæological party from the State University of Arizona have done some work in examining ruins in this section, and the writer believes that the excavating that he has mentioned in and about some of the ruins was done by them. So far as the writer knows, however, no detailed description of the ruins of this canyon has as yet been given to the public by any one.

111 Z. This a small village site in the flat, though on a little sand mound about half a mile southeast of cliff-house ruin No. 35, on the north side of Laguna creek. It apparently was not large. No walls show. Much broken pottery is scattered about the place.

No. 112. This ruin (see plan, plate 2) is on top of a flat, triangular butte one-half mile southwest of ruin No. 35. On top of this butte, at the north-central part near the north apex, is a double rock pillar some fifty feet in height. About this are much broken pottery and immense broken rock blocks. On the east face of the pillar there are many pictographs of mountain goats (sheep), the coiled lightning, and one kachina. East of the pillar the village seems to have been built against it, or at least rather close to it. No ruins or debris now show to indicate that any part of a village was built against the west or north faces of the pillar, very large fallen rocks covering the space for quite a distance on these two sides. There is, however, considerable broken pottery on these two sides, which seems to have been placed in or under the rocks in this section in sacrificial offering. The village wall is built quite a distance south of the pillar on that side, probably for safety from falling debris from the pillar, and from the fact that some large fallen blocks of many tons each occupy this space.

From the cross east-and-west wall, south of the pillar, three projecting southward-leading walls can be traced in foundation in lengths ranging from twelve to twenty-nine paces in length, some of the walls showing a radial arrangement from a hublike center. At the terminus of the west wall line the outline of a room approximately four feet square shows. It had evidently been a stone-wall-inclosed room for storing sacred pottery, or a cist for burial, in which much pottery was placed with the dead. If used for the latter purpose time has removed all signs of bones from the debris. In it on the surface we found a cloud blower, a sieve pot used in the rain ceremonies, and parts of various other pots used in sacred rites, or at least like those now used by the Hopis in the ceremonies. There were also several smoothed pebbles like those used by the Hopis in some of their ceremonies.

The middle room of the ruin that shows was about six feet wide by thirteen feet long. The debris inclosed in the rock walls of the foundation is now 18 inches or more in thickness. This room seems to have been a bin room where the large corrugated storage jars were kept, as the pottery fragments seem to be almost wholly of these jars. The writer found two jars that had been tipped over and mashed flat, so they could not be saved. A pot smoother, used in smoothing pots in the making, was also found here. It was of a fragment of pottery about the size and shape of one's hand without the fingers. It has been much worn down in the pottery-smoothing process.

About 150 yards south of the rock pillar there is quite an earth mound, circular, and forty-one paces in diameter. It is apparently the debris on a "unit type" adobe village. No walls show. Much pottery is scattered about it. Also between the mound and the pillar there are several detached remains of foundation walls of rooms and also considerable shards occasionally, though now it cannot be certain that the village was continuous from the pillar to the mound. It would seem that the citadel was by the pillar and was of rock. The village home was that part now represented by the earth mound and the adobe parts between the citadel and the mound, now washed and blown away.

The top of the table on which this village is situated is wholly bare, except the mound site, and probably was so in the days of the village. The earth of which the village was constructed was carried up the rocky face to the top

of the table from at least a half mile distant, and must have necessitated an immense amount of labor for that day and time. The table on which the village was built is itself fifty feet or more above the plateau on which it is situated. In ancient times it was approachable only by four trails, three of which were partly by ladders, and the fourth could be climbed only by pecked handholds and footholds. Also, three of the trail approaches show piles of rocks that were used there for defense to bombard approaching enemies. The village was evidently built on the top of this isolated mesa for defense, and as such it was admirably situated.

It is the writer's belief that it was one of the fort locations that was used by the people who lived in the valley flats along Laguna creek in times of peace. The pottery found was in large pieces, which would seem to indicate that it was likely one of the places where the villagers made their last stand in the region and was probably one of the last abandoned. Probably 250 people lived in this village.

The site was pointed out to my helper, Mr. Taptuka, by our guide, Yellow Head, but was not visited that day, as it was too late to make the ascent from the valley. On the following Sunday, in a sand storm, Mr. Taptuka and one of the schoolboys visited it. Later then the writer visited it several times in company with Mr. Taptuka. It is the writer's opinion that he is the first white man ever to visit it.

No. 113. This was a small village—a few houses perched against a rock face in Laguna canyon at the foot of Man Head point northeast of ruin No. 21. Some pottery marks the site, also pictographs. One of the pictographs is that of a kachina scene. The village was small.

No. 114. This is the ruin of a village about two miles up the Segi, above the pass. It is in the flat north of the creek about a mile west of the first arroyo that enters the creek from the north on ascending the valley from the pass. About forty feet of the west wall foundation of the village is still in place. The foundation was at least partly of stone. The remainder of the village was undoubtedly of adobe, judging from the scarcity of rock about the site. Much of the original site has been carried away by the cutting back of a short stream draw. Much broken pottery, some pieces of large size, mark the site. The size of the village could not be estimated from its present state.

No. 115. This is the remains of a village on a knoll about one-eighth mile southwest of Swallow Nest ruin. It seems to have been a large village. Some rock and considerable broken pottery mark the site.

No. 116. This is a village across a little draw, around a point southeast of Sayaway (Baby rocks), twenty miles east of Kayenta. The writer saw it when taking care of the people sick with the "flu" in 1918, and also when securing school children in April, 1920, but on neither occasion could he spare time to examine it. It seems to have been a rather large village. Adjacent to it to the eastward and northeastward is the large flat of Laguna creek. There are springs in the foothills of the McElmo mesas to the southeastward, where the Navajos now obtain their water for house use. It is quite likely that water was impounded in these draws in the old times. The place was very much handicapped in the way of a wood supply. The only wood within miles of the place is greasewood brush, and it seldom gets more than two feet in height. The Navajos raise quite a bit of corn in the section now, and by

the better irrigating system the villagers undoubtedly raised large crops of that plant.

No. 117. This ruin is one mile east of the government hay meadows and the ruins previously described near there, ruins Nos. 46-51. It is small. Some rock and much broken pottery show. It was built on a black dirt flat, and probably was the house of a single family.

No. 118. This ruin is in a sand-dune region about a mile east of ruin No. 117. It is just east of the Chilchinbito-Kayenta wagon road. It was a very small village. Some rock was used in the construction. The pottery fragments are in small bits. Probably not more than five families ever lived on this site at any one time. This village and No. 117 appear to be very ancient. They both owe their existence to the government hay-meadow flats and the water impounded in them, the same as the ruins described in the region in the 1919 report.

No. 119. Over in the second flat, about a mile west of the ruins at the spring north of Chilchinbito, described in the paper of 1919, are the remains of a ruin now wholly reduced to the level, and its pottery is also broken into small bits. It therefore seems to be very ancient.

No. 120. This ruin is of a village on top of a small butte and surrounding it, principally to the south, about a mile and a half west of the spring north of Chilchinbito store. Also, about 100 yards east of the butte are the remains of a village, now reduced to the level. Some of the rocks used in this village and the village about the butte are still lying about them, the most being on the site of the village about the butte. There is also much broken pottery about the site. A large grinding slab from one of these ruins has been placed against a tree near the trail that passes the butte.

No. 121. This is the remains of a ruin reduced to broken pottery and rubblestone. It was situated on a ridge—at least the site now is—between two washes about one-fourth mile northwest of Chilchinbito spring, as the writer formerly called it.

No. 122. This ruined village is now being exposed by the shifting of dune sand along the north road from Chilchinbito store to about one-half mile north. Much small, fragmentary pottery marks the site. The scattered pottery indicates that it was probably a large village. The small pieces would seem to indicate that it is very ancient.

No. 123. (See plan, plate 4.) The ruins represented by this number are one-half mile northeast of Chilchinbito spring, as the writer gave it in his former report, now known as Tothlacon spring. Three separate villages show, designated (a), (b), (c). Ruin (a) is on top of a small promontory of probably 100 feet in length. Much pottery and rock of the walls still top the butte ridge; also two kiva depressions show. Ruin (b) is about 100 yards east of (a), in the sand-dune region adjacent to it. It was built partly of stone. Parts of the wall of one small room still stand, 3½ feet in height; it was of stone. The east-and-west wall is 6 feet long, the north-and-south wall 5 feet. Ruin (c) was a village about 200 yards north of (b). A mound of stone marks the site. The lines of some east-and-west walls show. The village seems to have been of the unit type. Probably 300 to 500 people lived in these three villages.

No. 124. About one-fourth of a mile a little east of north from ruin No.

123, out in an open sand-dune area, much pottery of large size is exposed; also some building stone and wall lines show. The foundation of one circular room less than 5 feet in diameter is conspicuously exposed.

No. 125. This is the remains of a village, or series of villages, that once occupied some buttes about one-eighth of a mile north of ruin No. 124. The buttes are not high, the highest being less than 25 feet in elevation; but their commanding position overtowered the valley to the northward. The west butte is an irregular square, probably 20 feet to a side. Rock foundations still in place show that every inch of it was built upon, to its very margin, the edifice probably being a watchtower. Much broken pottery marks the site. The building rock scattered about indicates that a village or villages was built around the buttes.

Ruins Nos. 119 to 125⁵ were all dependent upon Tothlacon spring and the impounded water in the flats to the westward for their water supply and for the irrigation of their crops, the same as the Chilchinbito ruins, previously described.

No. 126. Three small mounds were found on a sand ridge on the first bench north of the wash west of the Chilchinbito volcanic plug, about two miles northwestward from ruin No. 125. They were approximately in an east-and-west line and less than 400 yards apart. Each carried village debris in partial walls, and much broken pottery. They apparently had been separate villages, and each probably had about 100 inhabitants.

No. 127. This is a small ruin 300 yards north of the road, about a mile northeast of Church rock. A small mound of rock marks the center of the site. Lines of rock seem to indicate that some of the rooms were rectangular. Some pottery fragments are scattered about the site. Probably no more than fifty people ever lived in this place at any one time, and probably not half that number. This village appears to be of the circular ruin type, and probably of the pure type village as defined by J. Walter Fewkes.⁶

No. 128. North of the road, near the first point projecting northward into Laguna valley from the south, to the east of Church rock, there is a small mound (cluster) of rock, and there seems to have been a village of adobe about it. Probably fifty people lived here. The outlines of a fireplace show in the mound and some pottery fragments are scattered about the site. It appears to be another circular village, probably built around a towerlike kiva.

No. 129. A ruin similar to No. 128 was found on the south side of the road one-eighth of a mile east of the above-mentioned point. It was small and less than fifty people lived in it. Its center is now a pile of rock, around which adobe structures were apparently built, the rock pile representing the citadel-kiva part of the village.

No. 130. A small village was found about one-eighth of a mile southeast of ruin No. 128. It was of similar construction and was small.

No. 131. About two miles west of Sayaway (Baby rocks) and 100 yards south of the road an elongated village ruin was observed. It is 63 feet in

5. About 200 yards northeast of ruin No. 125 the writer found a vertebra of a dinosaur (?) near the trail as he was descending from the ruin to the valley. The vertebra has been presented to the geological department of the State University at Tucson, Ariz.

6. Fewkes, J. Walter; Prehistoric villages, castles and towers of Southwestern Colorado, pp. 31-39.

length by 30 feet in width, laid out in an east-and-west direction. Some stone of the foundation walls still occupy the site.

No. 132. This is a small ruin north of the road, not far from ruin No. 131. It has the central mound of stone, representing a central building, around which, no doubt, adobe structures were erected.

No. 133. (See plan, plate 3.) This ruin is called Donahotso Keetseel by the Navajos. It is the most massive structure built in the open yet seen by the writer. It is built on an irregular, low sandstone ridge southeast of Laguna creek flats, at the head of what is now known as the Donahotso cornfields of the Navajos. There are also indications in leveled areas that more extensive fields were farmed in the time of this village than now by the Navajos. A strange thing about this ruin is that it could have been built on a level-topped, elevated mesa not one-eighth of a mile distant to the north-westward, also in the valley, and could therefore have had the protection of the elevation. Moreover, on this flat-topped mesa there would have been a level place to build on. About a mile to the eastward there is another large, high mesa on which they could have built.

The ruin seems to represent two different periods of occupation. For a long time the whole area was used as a building site, then was abandoned. Then in a more recent time, judging from the appearance of the ruins, the sections 1, 2 and 3 were built of the old debris and occupied for a short while.

The ruins are of rooms built of white limestone that was carried from the top of the mesa a mile to the eastward, and the massive pile of stone must have necessitated an immense amount of labor. Many rooms still show in sections 2 and 3, the walls often being five feet high. The sections marked 1, 2 and 3 appear to be modern in construction. They look about as ancient in age as the ruins about the Spanish church north of Jemez Springs, N. Mex., that was abandoned about 1680. Probably 500 people lived in the last-built sections and 1,000 when the whole area was occupied in the remote time.

In 1894 Richard Wetherill did excavation work in this ruin, but so far as the writer can learn, no published account of his findings are extant.

The ruin as seen now lies at the head of the flats in which the Navajos now have their cornfields, the same being irrigated from the waters of Laguna creek, adjacent—a giant task to be done wholly by Indians without any aid from the government. As stated, the flat, leveled lands in the vicinity indicate that these Pueblos farmed a much larger area than is now farmed. The intensive irrigation in the upper reaches of the Laguna valley probably caused the abandonment of this region, on account of the shortage of water. Though for a smaller population the rains in the immediate vicinity would have been sufficient to furnish water for irrigating purposes, provided it was impounded, and there are indications that it was.⁷

The ruin seems to have been built of hard limestone for durability and for defense. Moreover, the only defense the village had was its walls.

No. 134. Around the point of the mesa on the eastern edge of the flats, about two miles east of ruin No. 133, a large ruin is represented by great

7. Laguna creek, now fifty feet down in a chiseled canyon in valley fillings, was so shallow that one could jump across it in the memory of children now attending the Marsh Pass school.

quantities of small bits of broken pottery scattered here and there in the shifting sand. The village was evidently built of adobe. The small bits of pottery seem to indicate that the village was very ancient. Probably 200 people lived in it.

No. 135. About half a mile east of ruin No. 134 is a village of similar size to the latter and in about the same state of delapidation. It is therefore undoubtedly very ancient.

NOTES AND REMARKS ON RUINS NOS. 128-134. As has been noted, these ruins are in Laguna creek valley, east of Kayenta. They are also all on the south side of the creek. A ruin on the north side will be described later. These ruins were all seen on a trip to Donahotso for school children. Little time was at hand to examine any of them. The most time, possibly an hour, was spent at Donahotso Keetseel while the horses were resting and eating. The valley here is wide and would make good farm land if there was sufficient water. In the old times the creek, if it existed at all, was not canyoned up as now and all the water that flowed through the valley was available for irrigation. Now the valley is a sand-dune, sagebrush, greasewood region.

Many of the smaller ruins of this valley appear to be of the circular ruin type, apparently built around a tower kiva in radiating, peripheral style. The central building was usually of stone, or at least partly of stone; the rest of adobe or wickerwork plastered over. The outer rooms seem almost always to have been of the latter make. At least no foundation walls show now, though pottery is profusely scattered about.

No. 136. This is a small ruin in the last valley north of the government hay meadows. It is about two miles about due west of ruins Nos. 46 to 51. It is in a wash at the foot of the trail that leads up from the foothills to the east to the top of Black mesa at this point. It was built in the inner canyon valley, and no doubt had a dam across the canyon at this point for the impounding of water. It was a very small village and was built of rock. A small mound and considerable broken pottery mark the site. Probably twenty-five people lived in it. It shows evidence of having been occupied for a considerable time. It probably was a watch village in the trail that led to the cliff village on top of Black mesa, some three miles to the southward, as will be described later.

No. 137. In Laguna creek valley, about half way between the Peach Trees and Black mesa, on the south slope of an east-and-west low bridge some seven miles west of Kayenta, there is a ruin. It is now reduced to scattered rock and some pottery. It represents a small village that probably never contained more than twenty-five people.

One-fourth of a mile east of ruin No. 137 there is a small mound and some scattered pottery fragments. Either a single-roomed house or the remains of a grave is represented here.

Also, about one-fourth of a mile southeast of the Peach Trees there is a small stone mound, probably the remains of a single-roomed house. Considerable pottery, is scattered here and there over quite an area east and south of the mound, but in no great quantity in any one place, and there is no indication of any other village site near. The village, or house, was probably of adobe construction, outside of the building stone that now makes up the mound, all of which has been removed by time. If a village it could never have been large, and evidently was not inhabited long.

Between ruin No. 137 and the Peach Trees, at about half the distance, there is a small knoll. On this there are indications that a small village once occupied its summit.

No. 138. This is a small mound of rock just north of the Marsh pass wagon road, about three miles west of the Peach Orchard. Much pottery is scattered about the site. The village seems to have been built in circular form, though time could not be had to examine it definitely on this point. Probably twenty-five people lived in this village.

No. 139. A small mound of a ruin was seen south of the road about half way between ruin No. 138 and where the road mounts the rocks at Marsh pass. It seems to have been circular, around a core room, and to have been built mostly of stone.

No. 140. (See plan, plate 4.) Along the north wall of Segi canyon, just as the wall makes the turn westward from Marsh pass, there is a shelf ninety feet in length, overtopped by an arch of Navajo sandstone. The shelf is narrow, but wide enough to have been used as a house site in the long-ago. On this shelf there is a line of debris of fallen walls. The front wall of one room remains one story high. Other walls, and foundations of other walls, can be made out, as shown in the plan. To the east of the shelf there is also a cave. The writer had passed the place time after time and had not noticed this ruin till May 6, 1920, when a suitable sun revealed it. It is not mentioned by Kidder and Guernsey or Cummings, each of whom did extensive work in that section. A hundred people probably lived in this village.

THE LONG VALLEY RUINS.

In the writer's former report he gives some of these ruins on the map in X marks, but does not describe them, as at that time he had not examined them. On the map⁸ he stated that they were seen by Kidder and Guernsey. Moreover, on their map⁸ they are marked by a "—," but are not described at all in their paper. Their remarks on the valley and its ruins are as follows:⁹

"Leaving Kayenta, one follows this (Kayenta-Tuba) road up the broad valley of Laguna creek, with the high, dark cliffs of the Black mesa on the left. After eight or nine miles the valley narrows, as the slopes of Skeleton (Segi) mesa close in from the north and west. A mile or more and one reaches Marsh pass itself, a narrow, rough defile, bordered on each side by high cliffs. On the right is the mouth of Segi canyon, a majestic red gorge with precipitous walls. Another mile and one is clear of the pass and in the most beautiful, long, grassy valley (Long valley), half a mile to a mile wide, walled in uncompromisingly on the south (east) by Black mesa and bounded on the north (west) by sloping ledges of red sandstone. . . . The scant drainage from this defile runs down through the pass, where it is joined by a more constant flow from the Segi system, the two forming Laguna creek and ultimately emptying into the Chinlee.

"Although there is no flow of water in these upper reaches of Marsh pass comparable with that of Segi canyon, there is a plentiful rainfall at certain seasons of the year. Every storm that crosses this part of the plateau seems to swing along the face of the Black mesa and deliver part of its rain upon the valley. The vegetation, while strictly of the dry-country type, is more

8. Loc. cit., plate I.

9. Loc. cit., pp. 55-56, 90.

luxuriant and varied than about Kayenta and The Monuments; particularly is this true of the little side canyons that lead into the red sandstone on the northern (and western) side, where hollows and pockets in the rock hold supplies of stored rainwater so large that they probably last through the dry seasons of all but exceptionally dry years.

"The valley is a level plane covered with bee plant, grass, sage and grease-wood. Its southeastern wall, as stated above, is formed by the steep, rough, pinyon-clad face of the Black mesa. The rise of the northwestern escarpment is much more gradual, and its total height considerably less. It consists of tilted sandstone strata, sparsely wooded with the inevitable pinyon and cedar. Along the base of these slopes are mounds and hummocks of sandstone, some bare, some drifted over with dunelike accumulations of sand. This whole northern side of the Marsh pass valley, with its warm southern and southwestern exposure, abundant water holes, and broad sweeps of good adobe soil for corn culture, must have been well situated for the homes of the ancient agriculturists, and the remains of their villages are scattered thickly along the edge of the flat land, from the lower gorges, where Segi enters, to the point three miles above, where our exploration closed."

In their report of 1915 they again make report on this region, as follows:¹

"A short time was spent in examining surface ruins above the section explored in 1914. They were found to occupy practically every desirable site on both sides of the valley to its head, and were also scattered through the pinyon growth on the first bench of Black mesa. As a rule, these ruins are much dilapidated, few walls showing above the surface, though it is probable that considerable portions of the foundations or other walls may be covered by sand and earth. There appears to be no difference between the pottery from one ruin and that of another, except that about the villages at the foot of the valley red ware seems to predominate, while at the upper end black-and-white and red occur in nearly equal quantities."

The valley is the result of a stripping of the Cretaceous (Dakota, Mancos and Mesaverde) rocks of Black mesa off of the harder Navajo sandstone of the Jura-Trias series to a wedge-shaped trough—all the rock in the region dipping eastward at a high angle—and then the aggrading of this trough with valley fillings to a wide, flat valley. It is called Long valley from the Long House ruin (Ruin A of Fewkes, Kidder and Guernsey, Cummings, and the writer), which tops a stone promontory about a mile southwest of the pass on the west margin of the valley. It is about six miles in length and from a mile to two miles in width. Its drainage is northward-northwestward through a wash to Laguna creek, entering it through a gorge. The valley is now being cut up much by gorges and washes and much soil is being carried away.

In this valley there are 2,000 acres of as good land as there is in the west, and in the days of the villages every bit of it was farmed, and then every bit of the water was impounded and used. Sites of reservoirs and dams show at intervals throughout the whole valley, even into the pass itself. To-day a fine reservoir project could be had at the foot of this valley. The damming could be done where the wash enters the gorge to descend to Segi canyon. Its channel there is narrow, the walls high and wholly of solid rock, and there is plenty of rock at hand to do the damming. Even for stock raising, a dam there that would impound the water would be a boon to the region. That the valley is a mudhole half of the year the auto drivers of the region will attest; besides the snowfall in the section is usually heavy. Four feet of snow

1. Loc. cit., p. 90.

fell in the winter of 1918-'19 and nearly the same amount in 1919-'20. Two thousand acres of land would produce crops there to-day without irrigation, if properly handled, while a Navajo has 10 to 20 acres under cultivation. The rest of the region is overrun by sheep and goats. In the summer of 1920 the weeds were as high as a horse over nearly the whole valley.

So far the writer has examined only a few ruins east of the road, as time would not permit the examination of the ruins on the east side of the valley. The ruins examined this year are given below in detail:

No. 141. This is a small mound of rock representing the ruin of a small village that was directly eastward from ruin B across the valley, probably one-half mile distant. Considerable pottery is strewn about the site. Probably twenty-five people lived in this village.

No. 142. This is a ruin about 100 yards northeast of ruin No. 141. It is of similar size and character to that one.

No. 143. This is the remains of a village on the east side of the road, about two miles southeast of ruin A. It was evidently of adobe, and was small. Only pottery fragments mark the site to-day.

No. 144. This is the ruin of a large village which occupied a sloping point and a detached rock mound about one-half mile southeast of ruin A.² Much pottery marks the site, and some signs of walls also show. Probably 150 people lived in this village.

No. 145. This is a ruin in the open and a cave one-fourth of a mile south-east of ruin No. 144. The cave floor is on a level with the valley, and it has recently been swept out by the wash that flows by it. Just south of it much broken pottery and other village debris are exposed, both upon the sandstone point and in the valley filling adjacent. The size of the village cannot now be conjectured, except that it was large.

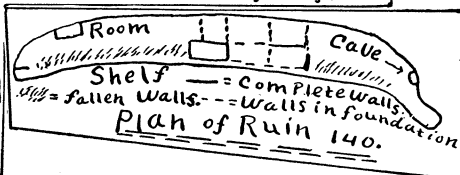
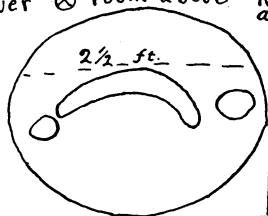
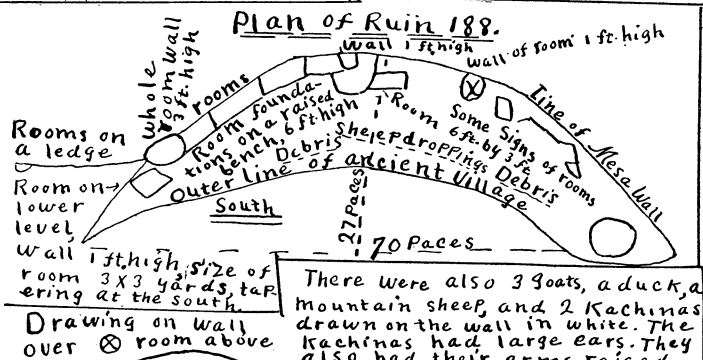
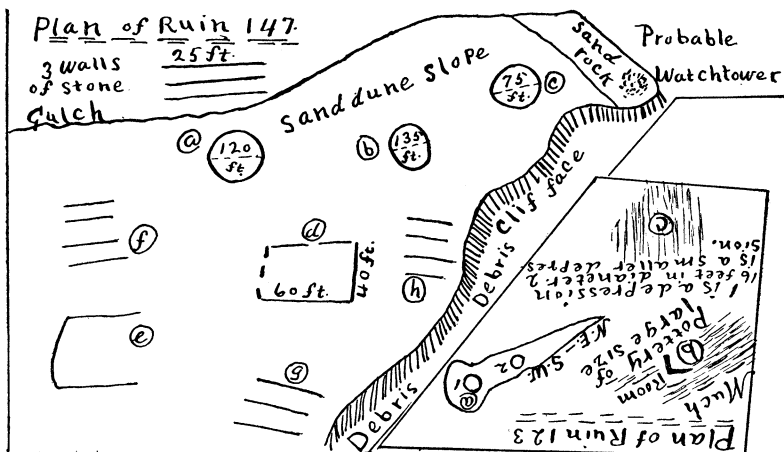
No. 146. The debris of a rather large village covers quite an area about one-half mile southeast of ruin No. 145. It is on a sloping point and on the sand dune that abuts it to the southeastward, while a tower probably occupied the summit of the rock point. The valley here makes a pocket to the westward, and it is on the cornering point north of the pocket where the ruin is situated. A wash sweeps past the point and has probably removed much of the original village. What appears to be two sections of the village can be distinctly made out, one on each side of the point, but no arrangement of the village could be determined. Much debris is also being uncovered by the wind in other sections. Probably 500 people lived in this village.

No. 147. (See plan, plate 4.) This ruin covers a sand dune that slopes downward to the valley from a point of sandstone that stands between two gulches. Also across the gulch to the southeastward three parallel stone walls running in an east-and-west direction stand out from the parallel cliff wall to a height of from 5 to 7 feet and from 20 to 25 feet in length. They are built on a terrace. Consequently, the walls are higher than each other accordingly as their position is above or below their fellows. Besides this wall, on the dune there are remains of three circular villages, two rectangular ones, and three places, marked (f), (g), (h) on the plan, where much village debris is exposed, each probably representing a village site.

2. Ruins A and B were described in my previous report, which see.

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PLATE IV.



(a) On the plan, (a) marks a circular village 120 feet in diameter, with a raised border, representing the walls, and a $2\frac{1}{2}$ -foot depression, representing the plaza. Its walls were of stone and quite thick. It has the appearance of being a younger structure than any of the others of the site, except possibly the parallel walls. This, however, is merely conjecture. In some respects this circular ruin resembles a giant kiva. Only excavation would determine its exact status. It seems, however, to be too large to have been a kiva. Moreover, its walls seem to be wide enough from the plaza sink to the outer rim to have been a series of rooms.

(b). This is a circular ruin very similar to (a). Its rock pile, representing the ancient walls, is highest at the north and northeast, though at no place is the mound so high as the circular mound of (a).

(c). This is a similar circular village 20 to 30 feet above (b), at the summit of the sand dune. The elevated circular rock mound here is not so conspicuous as in (a) and (b), but the central depression is more pronounced than in those ruins.

In many respects, as previously mentioned, these circular depressions, with outer wall rims, resemble kivas; but if they were such they were of giant proportions compared with the usual size of kivas of the region. Moreover, as we will see later on, there are circular villages in the region where the circular structure was the only edifice erected. Furthermore, the abundance of pottery would seem to indicate that each was a village and not a kiva.

(d) and (e). These are rectangular structures, as is shown in the rectangular foundations which still remain partly in place. The buildings were constructed of rock. Ruin (d) is about on a level with (a), but much below (b), and (e) is much lower down on the sand dune than (d).

If this village site was all occupied at one time, between 400 and 700 people must have lived in it. If the circular buildings were kivas—as only excavation, of course, can determine—they represent the gathering of a great population to this center. As stated, the evidence seems to show that each represents a circular village, or a circular segment of the whole village, if the whole area was inhabited at one time as a single village. It is the writer's opinion that the whole site was not simultaneously occupied.

No. 148. This is a ruin on a point of rock which projects into the valley a considerable distance southeast of ruin No. 147. It is circular, 123 feet in diameter, and shows quite a plaza depression. The pottery is scanty about this site, which would indicate that the edifice was possibly a kiva. No other signs of a village shows within a quarter of a mile of it.

No. 149. This is a small ruin on a projecting point, represented for the most part by scattered pottery.

No. 150. This is a considerable mound on a point, about which much broken pottery is strewn.

No. 151. This is the ruin of a small village on an isolated bit of rock out in the valley. The ruin was probably a watchtower. Some foreign rock was used in the construction. The pottery fragments about this site are scanty.

No. 152. This is a ruin on a point projection about a mile southeast of No. 151. Considerable pottery marks the site.

No. 152½. About a mile north of the divide (Cedar ridge), about $1\frac{3}{4}$ miles

northeast of Summit lake on the north side of the road, is the remains of a small village, evidently having been constructed of adobe. The ruin is just east of the first point of bright red rock west of the road (probably McElmo rock). Broken pottery mostly marks the site.

No. 153. This ruin is on a small point projection that projects into the valley from the west, about one-half mile southeast of ruin No. 152. The west-line wall still shows in the foundation, 42 feet in length. From this wall to the eastern limit of the pottery is 130 feet. The plaza or kiva still shows as a depression. Much broken pottery still marks the site and extends far down the slope.

No. 154. Out in the flat one-fourth of a mile from the west edge of the valley, one-half mile east of ruin No. 153, is a double ruin—a heap of stone—about which considerable pottery is strewn. The two mounds are in a north-and-south line with a space of twenty-five feet between them. Probably twenty people lived in each section of this village.

No. 155. This is a small ruin just north of a Navajo cornfield, about a mile north of ruin No. 156 (next described). The ruin is nearly all washed away. Considerable pottery fragments show. Possibly the ruin is on the upland and the pottery is wash material from it.

No. 156. This ruin is on a small stone ridge covered with sand, which projects into the valley on the west side of Long valley about a mile north of where the wagon road enters the valley from the mesa to the westward. Much pottery and some building stone mark the site. Probably 100 people lived in this village.

Ruin No. 157 is on the mesa bench inland, and ruins Nos. 158 to 160, including No. 158½, are on the east margin of the mesa bench overlooking Long valley from the west. All five of them are south of the road. The last four were probably placed on the mesa rim to overlook and guard the valley.

No. 157. This ruin is 400 yards south of the road on the bench one-fourth of a mile west of where the road descends into Long valley. It is on a low, flat-topped, circular knoll, 135 feet in diameter. About it pottery is being exposed. Prairie dogs are digging up the pottery. The flat top has a raised border now and then. The knoll is in the pinyon wood, where it is not disturbed by wash and wind. It is the writer's opinion that a circular adobe ruin remains there *in situ*, so to speak; in fact, it has all the appearance of being a typical circular ruin, which once possibly had peripheral compartments.

About 500 yards west of this ruin quite a quantity of pottery covers the surface, but there are no signs of a village. The pottery probably represents a grave.

No. 158. This ruin is on the east margin of the mesa, west of Long valley, as we have seen. It is 130 paces south of where the Tuba-Kayenta wagon road descends into that valley. A kiva 35 feet in circumference seems to be represented by a circular depression. The structure had been of adobe. East of it, down the slope, there is much broken pottery, indicating that the village that surrounded it was quite large. The village had also been of adobe and probably contained 100 people.

No. 158½. This is the remains of a village on the rim of the mesa about half way between ruin No. 158 and the wagon road. It was probably as large

as that village. Much broken pottery is being exposed on the rim and shards cover the whole slope to the valley.

No. 159. (See plan, plate 6.) This ruin is along the same face of the mesa, overlooking Long valley, 186 paces to the southward from ruin No. 158. It differs from that pueblo in that it was made of stone. The circular foundations of a kiva 24 feet across still show. Twenty paces south of the kiva the stone foundations of a long room still show, 22 feet by 10 feet, running in a northwest-southeast direction. Abutting the southwest corner of this building is a part of a circular foundation of rock of what was probably a small kiva. The circle shown is 12 feet across; also parts of other walls show. The plaza depression is $2\frac{1}{2}$ feet deep. Much pottery marks the site and covers the slope east of it all the way to the valley.

No. 160. This is a circular village ruin three-fourths of a mile southeast of ruin No. 159. It is 54 feet across. Some pottery marks the site and much fragmentary pottery covers the slope to the eastward. In many respects it looks like a large kiva, and now shows a depression of 3 feet in its center, though this can be accounted for by the raised rim due to fallen walls. Only excavation will determine whether it is the remains of a small circular village, around which temporary peripheral adobes were constructed, or a large kiva to a large village which has been washed away by the shifting of the mesa rim on which it was located.

RUINS ON THE MESA FLAT TO THE WEST OF LONG VALLEY.

Ruins Nos. 161 to 174 are on the mesa west of Long valley. The ruins seen were just those along the road. These were seen while Mr. John Schwarz and the writer were working the road from Calalmtý's hogan to Marsh Pass. About one mile from where the road climbs onto the mesa from Long valley there is a shallow basin north of the road, known as Summit lake, now dry most of the year. About three miles west of this lake, one-fourth of a mile to the north of the road, there is a large pool-like lake which has water in it more of the year than Summit lake (it was not dry at all during the summer of 1920). Its holding water better is due to the fact that the former lake now has a wash leading out of it to the eastward, which cuts down its collecting capacity. Also, to the westward of the pool washes enter the valley, and, spreading out, lose their water. These were probably dammed in the long ago, as villages were erected along them. The country is flat, with a knoll now and then. It is a mesa valley from three to ten miles wide. It is bordered on the east and southeast by the Cretaceous block of rock known as Black mesa, and to the north and northwest by the more gentle-sloping Navajo sandstone of the Shonto plateau. Leveled spots show that much of this flat mesa bench was farmed in the old times, and Navajos even now raise considerable corn in the area.

No. 161. This ruin is on a little knoll just south of the road, about east of Summit lake. Some rock was used in the construction. Much pottery is strewn in fragments about the site. About one-fourth of a mile east of this ruin there is a small mound on the south side of the road around which there is considerable pottery. It probably represents a grave.

No. 162. This is the remains of a large ruin on the top of a large sand ridge, due south of Summit lake. The village was of adobe and apparently

was circular. A sunken depression, which was probably the central plaza, now remains in oval shape, forty feet across. Excavation might show this depression to be a large kiva. A great quantity of broken pottery marks the site and extends down the southeast slope of the ridge, likely marking a graveyard. Probably 300 people lived in this village.

No. 163. This is a small ruin on the north side of the road about one mile west of Summit lake. It had been made of adobe, all of which has been removed by time. Practically only broken pottery marks the site. Probably twenty people lived in this village.

No. 164. What appears to be the remains of a single-roomed house or a grave was seen northwest of the road, about a mile east of the pool west of Summit lake.

No. 165. One-fourth mile west of ruin No. 164 a similar mound and a small quantity of pottery was seen on the same side of the road.

No. 166. This ruin is on a sand-dune bluff abutting the east face of a Navajo sandstone cliff one-eighth mile southeast of the above pool, north of the road, three miles west of Summit lake. It is the ruin of a large village. It had been built of adobe, all of which has been removed by time. A great quantity of broken pottery is strewn over the site. Judging from the amount of shards, 125 or more people must have lived in this village. The pottery was the Kayenta type of ware.

No. 167. One hundred yards northeast of ruin No. 166 is a ruin or a graveyard—which, of course, excavation would determine. The pottery does not appear to be Kayenta ware in design. The design on one of the specimens has not been seen by the writer at any other ruin.

No. 168. This is a ruin on a sand knoll north of the road, three and one-half miles southwest of the above lake and one-half mile southwest of the above pool. Much broken pottery is being exposed by the shifting sand. No rock or other debris remains, the village evidently having been of adobe. Its size could not be estimated.

No. 169. On the west end of the same sand ridge, north of the road and north of a gulch, broken pottery shows for a considerable distance, 400 yards or more, and seems to represent two villages. The pottery of the western section is apparently cruder in make than that of the eastern division. The pottery of the eastern division is true Kayenta ware. Probably 100 people lived in each section represented by the pottery. The villages, or sections of the same village if they should prove to be parts of one village, were evidently constructed of adobe, all of which has been removed by air and water action.

No. 170. This is a small ruin, marked by a small mound and considerable broken pottery. It is on the west side of the road, about two miles northeast of Thief rock. Some rock was used in its construction. Probably not more than twenty-five people ever lived in it at one time.

No. 171. This is a ruin east of the road, about one and three-fourths miles east of Thief rock. Some stone was used in the construction. Scattering pottery is strewn about the site. Probably not more than thirty people ever lived in this village.

No. 172. One mile south of east of Thief rock, on the southeast side of the road, there is the mound of a rectangular village, forty-four paces in

length by twenty paces in width. The village has been made wholly of adobe. Considerable broken pottery marks the site. Probably 100 people lived in this village.

No. 173. This ruin is composed of a small mound of rock surrounded by fragments of broken pottery. It was of the circular village type. It is on the northwest side of the road, about one and one-fourth miles southeast of Thief rock.

No. 174. Just about south of Thief rock, in the center of the valley, a small point of Navajo sandstone is exposed, and extending northward from this there is a sand ridge one-fourth of a mile in length. On the rock point there is a ruin, represented mostly by broken pottery. Similar debris marks the east point of the sand ridge. Some stone also is strewn about each site. Seventy-five people probably lived in each of these villages. About half way between them there are indications of a graveyard having been there in the days of the villages.

THE BLACK MESA CLIFF RUIN.

No. 175. Until last year (1919) that cliff houses existed in the Black mesa district was scouted by all archæologists visiting the region, because of the friable and unstable nature of the rocks composing the mesa; but this year (1920) dispelled that delusion. While looking for pasture for horses early in the spring, Ben Wetherill (of the cliff-house-finding Wetherill family) and Vetress Wade discovered a ruin in this mesa, and in July following it was wholly excavated by the Arizona archæological party under Professor Cummings.

This cliff house is on the west side of a canyon in the Mesaverde formation, on the top of Black mesa, at the head of the trail that leads from the (Laguna) valley some eight miles south of east of Kayenta. It is high on a shelf under an overtowering arch. Also, some sixty feet above the main village there are some balcony (gallery) rooms situated on a narrow shelf.

The original village covered a space about 100 feet in length by 30 feet in width at the very widest. It was characterized by having rather large rooms—larger, as a rule, than the average cliff-house village seen by the writer. A block now containing two rooms with doors are still entirely intact. This block of rooms is built against the back wall and has square outer corners. Near it to the northward are three or four rooms nearly intact. A south room has a rectangular front. Against the southeast corner of this abuts a round, tower-like room of probably three feet in diameter, with a little three-cornered space between them, which has also been walled up and used as a room. Farther on to the northward are several more rooms about complete in wall structure, one being almost circular in outline; also, both at the north and south termini are partial foundation walls of rooms. Partial foundations of other rooms also show in the main room line along the wall. Fireplaces are also in evidence in most of the rooms.

In addition to the tier of rooms, along the front space to the very margin of the bench edge are two kivas in foundation with back walls three feet in height still standing. One of these shows the ventilator, both show the raised bench space along the walls for visitors' seats, and both show the characteristic floor plan, sipapu hole, etc., and one shows a loom loop space in the floor.

OTHER RUINS.

No. 176. This is a ruin on and about a white Dakota sandstone promontory on the south side of a flat about two miles northeast of Chilchinbito. An extensive cave also shows on the northeast face of the cliff. The ruin on top of the promontory and in the cave to the northward has been nearly all blown away or disintegrated. Some scattered rock and fragmentary pottery remain. East of the promontory an extensive village has been covered over with dune sand, so that only piles of rock debris show now and then. The cave should be excavated. Probably 130 people lived on this site. Their farm lands were those of the valley adjacent, and water supply was evidently furnished by damming the wash which now flows along the north base of the promontory. Another wash a half a mile distant to the north has permanent water the year round. Possibly water from this wash was also used.

No. 177. What appears to be the remains of a village is being exposed in a sand-dune area east of a low rock point about one-half a mile east of ruin No. 176. Its size could not be conjectured.

No. 178. In the flat about a mile northeast of ruin No. 177 is the remains of quite a village that was evidently erected of stone that was taken out of the adjacent wash. Piles of rock and scanty bits of pottery mark the site. A peculiar thing about this village site is that some Navajo has laid out a conjectured city in lines of rock over the site, giving pretended foundations of variously shaped rooms.

No. 179. This ruin is across the wash from the last ruin on what might be termed the first bench-slope of the adjacent mesa. Much broken pottery is being exposed here by the shifting sand. No idea could be had as to the size of the village.

No. 180. The fragmentary remains of a small ruin shows on the north bank of Laguna creek about due north of Church Rock. A few rock and much broken pottery now mark the site.

No. 181. On the south side of the creek, about one-half mile west of ruin 180, there is considerable scattered pottery, likely the debris of a small village.

SEGI-OT-SOSIE RUINS, SNAKE HOUSE AND ADJACENT RUINS.

SEGI-OT-SOSIE SECTION.

Segi-ot-Sosie (slim, narrow) canyon and wash run northward through the northwest part of Tyende mesa some ten miles northwest of Kayenta. On reaching the flats north of the mesa, the wash continues on northward to the San Juan. The canyon is narrow, often only a few hundred yards wide with walls 500 to 700 feet in height. After extending southward from the canyon mouth for more than a mile and a half the canyon forks, one branch (West canyon) taking a northwesterly course, the other continuing on in a southerly direction. The South canyon has side pockets in it, one large one extending eastward about one-half mile above where West canyon leaves the main canyon. The writer will call this canyon East canyon. West canyon also forks after extending a half a mile or so, each fork becoming very narrow, though to where it forks it is itself as wide as the main canyon below the forks.

In these canyons there is an abundance of clear water running on a level with the canyon floor, also big trees and grass. Just above the forks of the main stream in South canyon there are numerous bubbling springs and a fine Navajo peach orchard, in which alfalfa is growing. At the mouth of the main canyon a Navajo is irrigating three acres of alfalfa, when there is water enough to irrigate a section of land. Moreover, in the long ago 1,000 people lived in this canyon and had a good living, where now within its high walls and in the tributary country thirty-five Navajos starve.

Along the walls of this canyon there are caves, overhanging cliffs and pockets. All of these have at times been house sites for the abode of aboriginal man of the cliff-dwelling, village type. Villages were also erected in the open now and then. Those examined by the writer are given below. Others could not be visited for lack of time.

No. 182. (See plan, plate 3.) This is a ruin along the east wall of West canyon. The ruin is a cliff house which was once quite large. Two rooms are still practically intact and many walls are practically entire. Others can be traced. Probably 100 or more people lived in this village. Rock and adobe were both used in the construction of the houses. This ruin has been examined by Dean Cummings, and last July (1920) Professor Guernsey did excavation work in this ruin, securing, among other things, a string of shell beads forty-two feet in length. So far as the writer knows, there is no published work on this ruin.

No. 183. This is a large ruin under a cliff up the same small canyon northwest of ruin No. 182. It was examined by Dean Cummings and party in 1917 and much valuable material taken from it.

No. 184. This is the remains of a ruin in the valley in the open, in the same little canyon, one-eighth of a mile southeast of ruin No. 183. Only broken pottery now marks the site.

No. 185. This is a ruin in the pocket of East canyon. It was seen by the writer only at a distance. The writer has been advised that Mr. Guernsey found much valuable material in this pocket last July.

THE SNAKE-HOUSE SERIES OF RUINS.

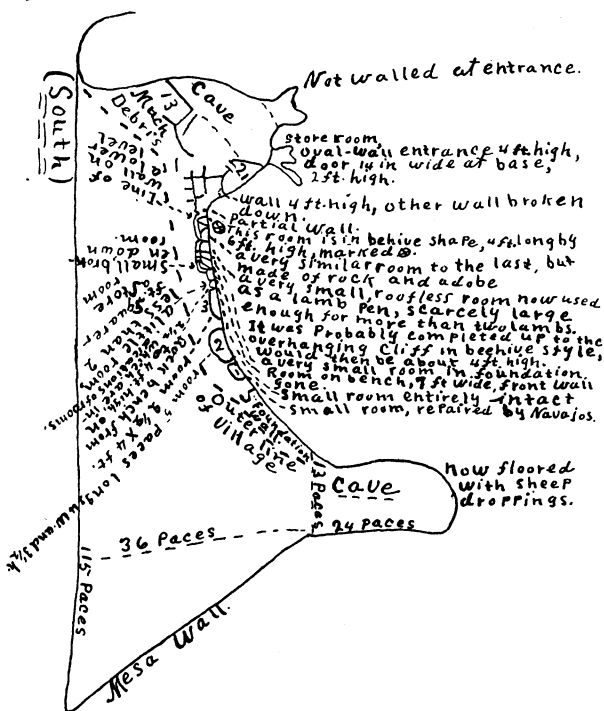
About two miles west of Segi-ot-Sosie canyon a parallel canyon runs northward between Tyende mesa and Skelton mesa. Also, after coming out in the flat beyond the former mesa, the wash from this canyon skirts the latter mesa for several miles till it joins Segi-ot-Sosie wash, the combined wash finally reaching the San Juan, as we have seen. In this area the east front of Skelton mesa is pitched eastward at a high angle, as a part of the broken Comb ridge system, showing quite a rugged character. A long line of sandstone cliffs and points sloping eastward, jagged and toothed, with intervening valleys, canyons and *rincons*, are the outstanding, conspicuous features. In the pockets and side canyons and in the protected places in the open there are ruins of villages and storage bins. Some of these have been seen and partially examined; others have not. Below are those known to the writer.

No. 186. (Snake House; see plan, plate 5.) This ruin is about five miles southwest of Oljeto and about three miles northwest of the mouth of Segi-ot-Sosie canyon. It is a large village in an isolated, jagged valley along the southeast front of a small detached mesa and in two extensive caves in the

same, one at each end of the outer ruin. The east cave is about 100 feet deep back into the cliff, and probably 25 feet wide. It seems to have been a large council hall. It is smoked from end to end and has much pottery debris on its floors. No signs of rooms now remain. The cave at the west side (end) is 40 feet wide at the entrance, runs back 40 feet, and has two sets of additional rooms running back from it into the cliff. The north room is walled in now, and was used as a bin. Part of the wall that inclosed the south room also shows. Parts of walls also show in the main cave room. In

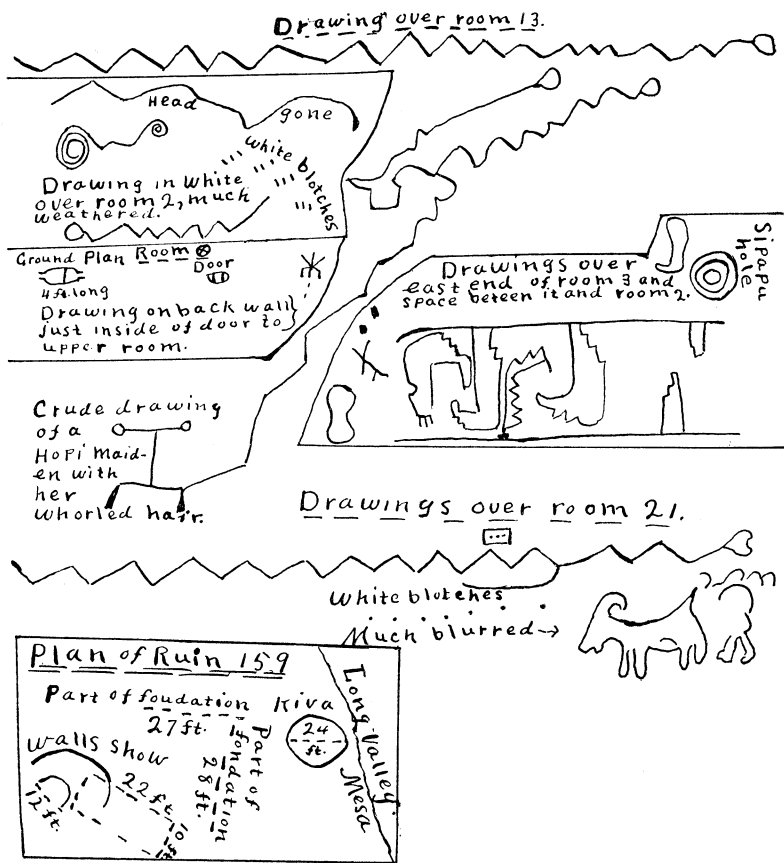
PLATE V.

Plan of Shake House,
Ruin 186, near Oljeto, Utah.



addition it is inclosed (shut in) by an outer wall. Along the wall between the two caves are the remains of an open village that was probably 25 feet wide. Many rooms are still intact, with roofs still on them. Some are flat-roofed; some are built in half-beehive style against the wall. All are small and all have very small doors. Above the west end of the outer village is a large drawing of a huge snake 40 feet in length in zigzag, with 21 joints. Its head is two-thirds as big as a plate and in that shape. The whole drawing is white. Several other snakes are also drawn on the walls. The snake clan of a tribe evidently lived here, probably a snake clan of the Hopis. The ruin received its name from the snake drawings over it.

PLATE VI.



Drawings about snake house.

The Cummings party examined this ruin some years ago, and Professor Cummings figures a picture of this ruin in his report and also makes mention of the ruin.³

Probably 100 people lived in this village.

No. 187. This is a cave ruin in an isolated rock ledge about a mile south of Snake House. It was not seen by the writer, and so far has been seen only by Missionary Leigh Segar, of the white race. An Indian has found some nice pottery in this ruin, among which was a large corrugated storage jar filled with pumpkin seeds. Not knowing the value of these seeds, the Indian let the mice eat them. The Indian gave the missionary the jars he found, and they are now in the state collection at the university at Tucson.

No. 188. (See plan, plate 4.) A cliff-arch ruin two miles south of Snake House, under a south-facing arch of the east face of Skelton mesa, was once a considerable village. It has been excavated by Navajos. Last spring (1920) an Indian dug up a large corrugated jar from it, which he much broke in re-

3. Cummings, 1910.

moving it. The jar had yucca harness about it, and also had a flat rock placed over its top when found. A much larger decorated jar was broken in getting it out. Pumpkin seeds, pumpkin vines, sandals and various other things were dug up and left by the Navajos. The writer picked up all that was left when he visited the ruin, August 29 of the same year, and they are now in his collection. These include sandals, prayer sticks, rainbow-hoop prayer sticks, and feathers, besides the pumpkin vines.

MONUMENT VALLEY AND ITS RUINS.

This region lies between El Capitan and The Monument. The washes all head in the El Capitan plateau, and after running a northern course of a few miles they all come out on the Monument flats, either singly or as combined washes, where they join in a master wash in a sand-dune-swept desert area. There are no permanent springs in the region, but pockets in the rocks usually hold water the year round, with the exception of exceptionally dry years. The semidesert vegetation is composed of cedar and pinyon scrub oak; and box elder heads some of the canyons and also grows in a few favorable spots. Narrow-leafed yucca, greasewood, sage and cactus are the small plants most seen. Navajos with their sheep and dirt (hogan) houses are seen now and then, while at intervals a corn patch is seen in some favored spot.

In this region there are no large ruins. Many of the cliff-house inclosures were bins and not dwelling places. About these there are usually but scanty or no pottery fragments and little or no rubbish. Moreover, these rooms are usually not smoked; neither do they show any other signs of having been used as dwellings. Other ruins seem to have been hunting or summer lodges. Several others, though small, seem to have been permanently inhabited.

The smallness of the ruins that show any signs of having been used as dwellings at all, and the fewness of them in this extensive area, would seem to indicate that the region then would not support a larger population than now, provided the people had only the same wants. This again verifies the claim that the climate in the region of this valley was the same in the days of the villages as it is now, and that it was the same in the whole Kayenta region then as at the present time.

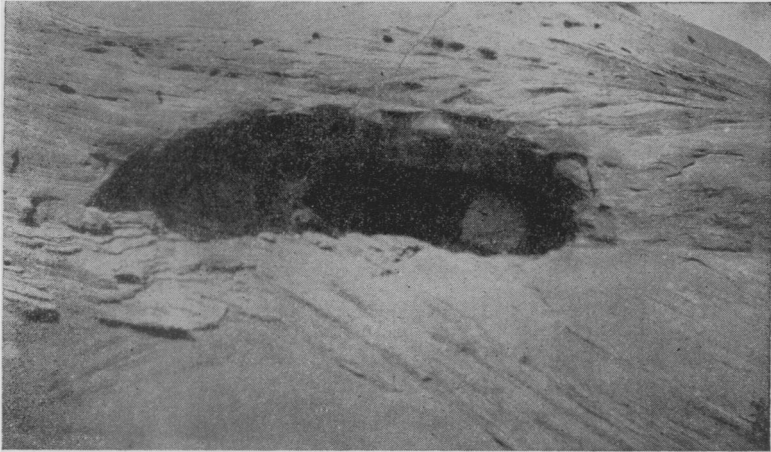
This region was visited by Kidder and Guernsey in 1914 and several ruins were examined. These were also visited by the writer, and in the report they will be given only a short description, or merely mentioned, the readers being referred to the report of the above authors for a complete account of their findings.⁴

No. 189. Soon after entering the canyon on the direct road northward from El Capitan, five miles north of that volcanic monolith, there are ruins on a cliff bench along the southeast wall of the canyon. One large room has been closed in. It had been almost oval in shape. The wall showed the door in the center; it had been small. The upper east half of the wall has fallen. On the same ledge to the southwestward were two other small, old-fashioned beehive-shaped ruins (cut in half) set against the wall. Their walls were intact. Near them to the southwestward, above the same ledge under the same overhanging cliff, holes had been wholly or in part chiseled in the rock and walls

4. Loc. cit., pp. 15-45.

placed across them. One of these small rooms was placed above another of like dimensions. These were probably storage rooms. Probably there are more ruins in the vicinity, but time would not permit looking for them.

No. 190. On the opposite side of the canyon, about a mile north of ruin No. 189, are several cave holes in the sandstone wall of the canyon. All no doubt were used as caches or dwellings in the old times, but now the walls and debris in many instances have been removed by time. Others still have the front walls more or less intact. One of these is ruin No. 190, here given. It is sixteen feet long by three and one-half feet high at the mouth, and tapers back. Its mouth is five feet wide by four and three-fourths feet high, rounding slightly at the top. The door is eighteen by twenty-four and one-half inches. A rear cross wall shows ten feet from the mouth. Much guano covers the floor. Near



Two granary rooms in Monument valley canyon. Ruin No. 191½.

it, on the same level, is part of a wall to a similar cave room. These ruins are figured on plate 2 of Kidder and Guernsey's report and are designated as granaries, which they undoubtedly were.

No. 191. This is a similar cave ruin, 105 yards north of ruin No. 190, 40 feet higher up on the ledge.

No. 191½. This is a double ruin on the west side of the canyon, near its mouth. This double ruin is figured at the bottom of plate 2 of Kidder and Guernsey's report. It evidently was a granary. See photo herewith by the writer.

No. 192. (Ruin No. 1 of Kidder and Guernsey.) Out in the flat northwest of the mouth of the canyon there is an isolated hummock mesa of sandrock. On the southeast side of the hummock, in a recess about 20 feet up, there is a cliff house. For a complete description of this ruin see Kidder and Guernsey's report, pages 16 to 19, to which the reader is referred. A mound ruin of a village also shows near this cliff cave.

No. 193. This ruin is about a mile west of the last ruin in another (Sayod-neechee) canyon. It lies in a cave seventy feet across the mouth. To the writer, who was alone, the place was inaccessible, as to enter the cave one must climb over a fifty-foot sloping rock and then climb straight up twenty or more feet. This ruin is ruin No. 2 of Kidder and Guernsey's report (pp. 19-24), to which the reader is referred.

No. 194. This is a mound one-half mile below ruin No. 193 in an eastern side canyon. It is irregularly circular, one hundred and three feet in diameter and four feet high at the center. It is probably the ruin of a circular village of adobe or wickerwork construction. For a further account of this village and the cliff house near it, next described, see Kidder and Guernsey's report (pp. 24-27).

No. 195. Near the above mound is a much-smoked one-roomed house in a little cave. It had evidently been used as a dwelling.

No. 196. (A watchtower.) Opposite ruin No. 193 there are three buttes. The southernmost of the three has what appears to be the remains of an ancient watchtower. For a further description of it, see Kidder and Guernsey's report (pp. 26-27).

No. 197. Nearly opposite ruin No. 193, on the same side of the canyon as the "watchtower," there is a burial cave. It was hurriedly visited. In this cave four burial cists show excavation, in which Kidder and Guernsey exhumed thirty-two skeletons. For a description of this cave and its cists the reader is referred to the report above mentioned (pp. 27-32).

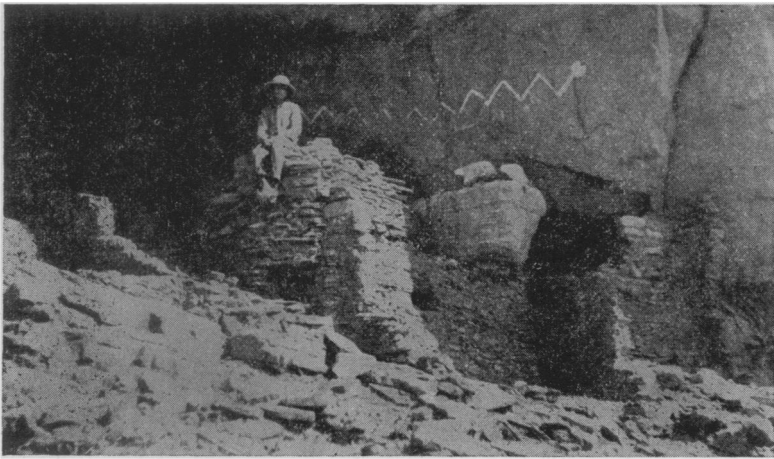
No. 198. About a mile a little south of east from ruin No. 192, in an east-entering side canyon, is a ruin in an enormous cave some 70 feet above the valley, with the canyon walls rising absolutely sheer to a height of 200 feet above it. It is inaccessible for a lone man, as 30 feet of the approach is perpendicular. This ruin is ruin No. 3, or Fire Stick House, of Kidder and Guernsey, to whose work the reader is referred (pp. 32-36). In their report they state: "We found it to consist of a single line of ten living rooms with a continuous front wall, but flush with the edge of the cliff. The back part of the cave slants up too steeply to have been available for buildings. There is no kiva, nor could we find any trace of one in the valley below."

No. 199. This is ruin No. 4, or Pictograph Cave, of Kidder and Guernsey. The most interesting feature of this cave is its pictographs, hand prints, human figures with peculiar headdresses, etc. The ruin consists of a little group of rooms built against the cliff about 587 yards below ruin No. 198. They are partly sheltered from storms by a great shoulder rock and partly overhung by a 200-foot precipice. The buildings were in a very poor state of preservation. For a more detailed account of this ruin see the above-mentioned report (pp. 36-40).

No. 200. This is a cliff cave on the east side of the mouth of the (Monument) canyon, 400 yards west of a water hole on the north side of an east-leading side canyon. The cave is 40 feet across the face, 12 feet deep and 20 feet high. It was once used as a cliff-house site. The debris is now wholly gone, as it has been swept for ages by the southwest wind.

No. 201. This is a rainbow-arch cave around a corner point of rock on the north side of another east-leading side canyon, about one-eighth of a mile

southeast of ruin No. 200. It has 100 feet front, facing the south. It is 100 feet high to the top of the arch from the valley. The arch is 40 feet above the base of the cave. The bridge part is 12 feet wide. A cliff house has been built under each approach, but the east one is now wholly gone. Under the west abutment there are two rooms. One is wholly intact; the other has only the foundation left. Each was built in the old-style, semibeehive shape against the wall, like a half cone set against the wall. The north room, which is only in foundation, is filled with bat and rat guano. It was about 10 feet across. The south room is about 16 feet across the semibase line, 7 feet deep and 6½ feet high. The door was on the north face. It is about 18 by 24 inches. The sill above the door was of wood and is still in place. The walls were of rock and adobe plaster. The mortar was well laid and is quite hard. The village was certainly in an ideal place.



Snake House, near Oljeto, Utah.

No. 202. A similar natural-bridge cliff cave to ruin No. 201 is situated around a point of rock on the same side canyon, about 120 feet east of that ruin, but is considerable larger. The debris is now wholly removed, but the space beneath the bridge once evidently contained rooms.

One hundred twenty feet above this space bridge-cliff cave, a little to the rear, is a long arched-over, inaccessible cave. From the nearest point to it that could be reached no debris or rooms could be seen in it. Its axis lays east and west and it is open to the south.

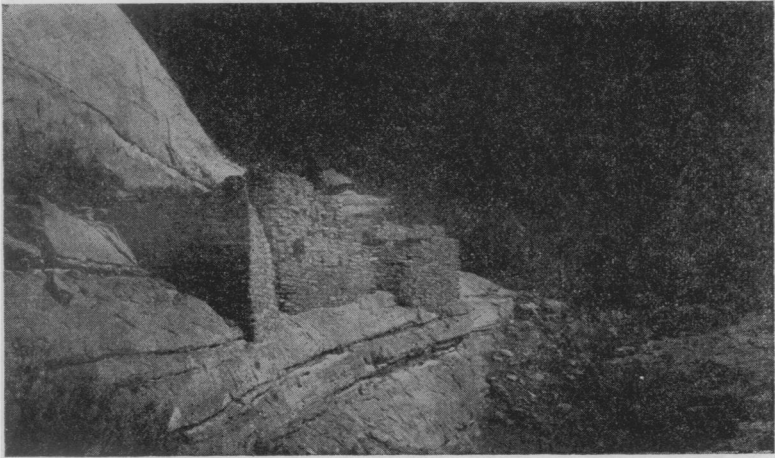
No. 203. Debris on the north side of the same canyon, 300 yards northeast of ruin No. 202, now shows, but the size of the original village cannot now be determined.

No. 204. This is a village in the open, across the canyon south from ruin No. 201. It resembles the open ruin near ruins Nos. 192 and 194, except that some stone shows in the foundation as well as room walls. Part of the foundation walls of three rooms show; also some pottery fragments are scattered

about the site. Parts of a cist two feet square, surrounded by rocks on edge, also still show. The village was of the circular type and was evidently very small.⁵

CONCLUSION.

In this region there are many circular villages with peripheral compartments, also some D-shaped villages with the straight line on the south side. These are very similar to the circular and D-shaped ruins described by Doctor Fewkes.⁶ "Great houses" do not exist in the region in standing position, unless Long House (ruin A) is one; but there are indications in foundations that such houses did exist. Moreover, had the rock of which many of the villages and buildings were made been as durable as the much harder rock of which the prehistoric villages, castles and towers of southwestern Colorado were constructed, the region undoubtedly would be studded with village



Ruin 102, in Kaykohte canyon.

masses, great towers, etc., to-day, the same as that region. From descriptions the writer has seen he would judge that the Colorado ruins were built of limestone or very hard sandstone; the Tuba-Kayenta ruins were erected of friable, crumbly, soft sandstone, mostly of the Navajo formation of rock, when not made wholly of adobe or of latticework and plaster. The only exception the writer has seen is that of Donahotso Keetseel (ruin No. 133) of this report. It was constructed of very hard limestone, and to-day it makes a considerable pile, with some rooms still intact, though the village is exposed in the open. This also brings up another point: Were most of the villages which are now reduced to a few inches of debris in depth, including fragmentary pottery, made of soft sandstone, and has the time since they were evacuated been so great that the building blocks have entirely disinte-

5. At times village sites mentioned in this report might have been segments of a scattered village, like the scattered segments of the Jemez village of the present day, but as there is no evidence at this late date that they positively were, each mound, etc., has been considered as a unit in itself, unless otherwise stated.

6. Loc. cit., pp. 31-36.

grated and been removed by wind and water? It would seem that such is the case, but a great deal more study will have to be given to the ruins of the region before such a conclusion can be verified.

As a concluding sentence, the writer wishes to add that either an immense people lived here at one time or a small population a great number of years. The data seems to point to the latter conclusion.

Some Notes on the Lummi-Nooksack Indians, Washington.

ALBERT B. REAGAN.

In 1904 I was placed in charge of the Lummi reservation in the state of Washington. Below are some of the observations I made while in charge of that reservation and its Indians.

The Lummi Indians occupy the Lummi peninsula, facing Georgian bay and Hale's pass, about twenty miles south of the British Columbia line, just across Bellingham bay from the city of Bellingham, Wash. The Lummis are now mostly half-breeds. They number about 375. The full-bloods are nearly all old people. These are much diseased. Practically all of them have the sore-eye disease called trachoma (?), and many of them have it in such a virulent stage that they have become blind. These Indians are fishing Indians, but also farm on their allotments. Their principal fishing season is August and September. The fish caught are salmon and halibut. These they dry for themselves or sell to the canneries. They now dry their fish in a fish house, but in the old times they would cut the fish into strips or halves and place same on a puncheon slab and prop this up before the fire. In the old times they made flour from fern roots. They also made salmon egg cheese. They put salmon eggs in a hair-seal pouch, and this they hung up in their smokehouse to dry and be smoked by the smokehouse fires till cured to the Indians' taste. A white man probably would not have relished it.

The tribe as known to-day is made up of the Lummi, Snohomish, Nooksack and British Columbia Indians. They belong to the Salishan linguistic stock and now all speak the Lummi branch of that language. The Chinook jargon is also used extensively. The young people all speak English well.

Besides being fishermen, each Indian has an allotment on the reservation. On these they are now doing quite extensive farming, which is well done, and in 1904 their houses were often better than those of their white neighbors, though sometimes not kept quite so neat and clean. In fact, they have advanced nearly to our standard, many even taking daily papers.

In the old times these Indians practiced all the ceremonies known to their linguistic group. They waged war for the sole purpose of capturing slaves. Moreover, they had grades or castes, in a sense, among them. There were chieftain stock, common people, and slaves. Furthermore, the results of the hunting and fishing trips were portioned out among the participants by the leading chief according to the standing of each person. For instance, the chief always got the choice part of the whale. This consisted of the saddle and other special parts. The base people received the red meat, but little or no blubber. These people flattened their babies' foreheads so that a modern hat fits them better crosswise than the way a white man would wear it. They had puberty customs and mortuary dances, and had many dance lodges and secret